

AFML-TR-72-55

AD 740916

SEVENTH ANNUAL REPORT OF THE
MACHINABILITY DATA CENTER

1970 - 1971

ROBERT E. SNIDER
Metcut Research Associates Inc.

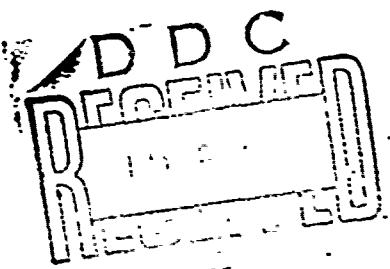
TECHNICAL REPORT AFML-TR-72-55

APRIL 1972

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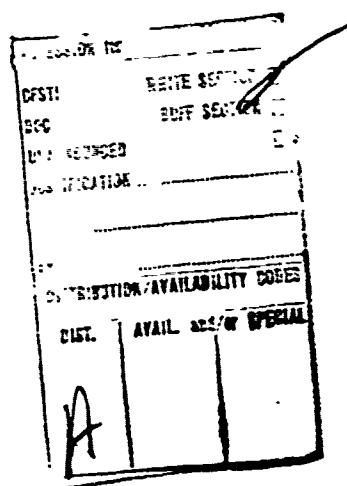
AIR FORCE MATERIALS LABORATORY
AIR FORCE SYSTEMS COMMAND
WRIGHT-PATTERSON AIR FORCE BASE, OHIO



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Robert E. Snider

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13. ABSTRACT

This report covers the seventh year of operation of the Machinability Data Center from October 1, 1970 through September 30, 1971 (Contract F33615-71-C-1112). During this contracting period 4,246 documents were processed from which 11,316 cards were keypunched. Currently, there are 121,459 supporting records on punched cards which permit computer searches to be conducted for citation to 43,574 specific machining situations coded on MDC's documents.

During this reporting period, 807 specific inquiries were answered for 398 different organizations representing 517 individuals. Since the Center's operation began in October 1964 a total of 6,546 specific inquiries have been processed. The average number of inquiries was 67 per month at an average processing cost of \$48.23 per inquiry.

Statistics are presented for estimated cost savings of MDC users. Through September 30, 1971 it has been very conservatively estimated that these savings amounted to more than \$55,000,000.

Also in this report are tables and information reflecting MDC activity in other areas related to data publications, Government activity, types of inquiries, etc.

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AIR FORCE MATERIALS LABORATORY
AIR FORCE SYSTEMS COMMAND
WRIGHT-PATTERSON AIR FORCE BASE, OHIO

FOREWORD

The Seventh Annual Report of the Machinability Data Center (MDC) covers work performed under Contract F33615-71-C-1112 from October 1, 1970, through September 30, 1971. The work described in this report covers that accomplished under project No. 8975, Materials Information Analysis Centers, Task No. 897506, Machinability Data Center. It also cites some statistics covering the 6-3/4 years that MDC has been in operation. This Center is operated for the Air Force Materials Laboratory, by Metcut Research Associates Inc., 3980 Rosslyn Drive, Cincinnati, Ohio 45209. The manuscript was released by the author, Robert E. Snider, Director of MDC, in October 1971 for publication as an MDC Report.

The work was administered under the direction of the Air Force Materials Laboratory, Wright-Patterson Air Force Base, with Mr. E. L. Horne (LAM) AFML Program Monitor.

For a complete analysis of the progress made by the Center from its early inception to the present, the following seven references should be reviewed:

"Final Report on the Design of a System for Collecting, Evaluating and Disseminating Machinability Data for Aerospace Materials", Technical Documentary Report Nr. ASD-TDR-63-572, July 1963, AD-416743.

"First Annual Report of the Air Force Machinability Data Center", AFMDC 65-2, February 1966, AD-482278.

"Second Annual Report of the Air Force Machinability Data Center", AFMDC 66-4, February 1967, AD-813037.

"Third Annual Report of the Air Force Machinability Data Center", AFMDC 67-8, February 1968, AD-829879.

"Fourth Annual Report of the Air Force Machinability Data Center", AFMDC 68-6, October 1968, AD-844920.

"Fifth Annual Report of the Air Force Machinability Data Center", AFMDC 69-6, October 1969, AD-697794.

"Sixth Annual Report of the Air Force Machinability Data Center", AFMDC 70-5, October 1970, AD-722478.

This technical report has been reviewed and is approved.



Edward Dugger
Chief, Materials Information Branch
Materials Support Division
Air Force Materials Laboratory

ABSTRACT

This report covers the seventh year of operation of the Machinability Data Center from October 1, 1970 through September 30, 1971 (Contract F33615-71-C-1112). During this contracting period 4,246 documents were processed from which 11,316 cards were keypunched. Currently, there are 121,459 supporting records on punched cards which permit computer searches to be conducted for citation to 43,574 specific machining situations coded on MDC's documents.

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Statistics are presented for estimated cost savings of MDC users. Through September 30, 1971 it has been very conservatively estimated that these savings amounted to more than \$55,000,000.

Also in this report are tables and information reflecting MDC activity in other areas related to data publications, Government activity, types of inquiries, etc.

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INTRODUCTION

The Machinability Data Center has been operated continuously since October 1, 1964, by Metcut Research Associates Inc. From October 1, 1964 through October 1, 1968, the Center operated under contracts from the Manufacturing Technology Division of the Air Force Materials Laboratory. On October 1, 1968, government administration of the Center was changed to the Materials Information Branch of the Air Force Materials Laboratory. Another change of administration took place during this contract period on August 1, 1971. The Defense Supply Agency assumed contract responsibility with the Materials Information Branch of the Air Force Materials Laboratory at Wright-Patterson Air Force Base continuing technical monitoring of the Center's activity.

This Seventh Annual Report of the Machinability Data Center presents accomplishments and progress during the period from October 1, 1970, through September 30, 1971.

Contained herein are charts reflecting data input activities and the scope of services provided industry and government in answering technical inquiries and the dissemination of data through the sale of data publications.

DESCRIPTION OF MDC

MACHINABILITY DATA CENTER, 3980 ROSSLYN DRIVE, CINCINNATI, OHIO 45209. Operated for the Department of Defense, Defense Supply Agency, with technical aspects being monitored by the Air Force Materials Laboratory, Materials Support Division, under Contract F33615-71-C-1112, by Metcut Research Associates Inc.

SCOPE

The Machinability Data Center (MDC) collects, evaluates, stores, and disseminates material removal information including specific and detailed machining data for the benefit of industry and government. Strong emphasis is given to engineering evaluation for the purpose of developing material removal parameters, such as speeds, feeds, depths of cut, tool material and geometry, cutting fluids and other significant variables. Data are being processed for all types of materials and for all kinds of material removal operations such as turning, milling, drilling, tapping, grinding, electrical discharge machining, electrochemical machining, etc.

COLLECTION

MDC has a data file of over thirty-two thousand selected documents pertaining to material removal technology. This data file is supported by a retrieval system which is controlled by an IBM 1130 computer installation. Information retrieval is based upon the specific material (with definite chemical, physical, and mechanical properties) and the specific material removal operation being used. Computerized search techniques are employed utilizing a combination of search parameters to produce source data. Information retrieval can be refined to the extent necessary to satisfy the requirements of a specific inquiry by controlling the input search parameters.

INFORMATION SERVICES PROVIDED BY MDC

MDC maintains an intensive effort to serve as a communication link for both government and industry by providing services related to the field of material removal. MDC's output consists of providing analyzed data in response to technical inquiries, compilation and marketing of data publications on subjects of current interest to the manufacturing industry. MDC also maintains a selected mailing list for providing notification of the availability of new information and services from the Center.

TO REQUEST MACHINING INFORMATION.....

Telephone: 513-271-9510
TWX: 910-461-2840 or
Write: Machinability Data Center
3980 Rosslyn Drive
Cincinnati, Ohio 45209

NOTE: Association of the names of companies and individuals with specific requests is kept confidential. However, data developed remain the property of MDC for dissemination as required for answering similar inquiries and for developing data publications.

SUMMARY OF MAJOR ACTIVITY

Contract Change

During July, 1971, the Center's Contract No. F33615-71-C-1112 was modified to reflect the change in DoD funding from the United States Air Force to the Defense Supply Agency with technical monitoring to remain under the Air Force Materials Laboratory, Materials Support Division.

On August 1, 1971, the name of the Center was changed from Air Force Machinability Data Center to Machinability Data Center (MDC). Plans and work were started in order to implement the directive in the new "Statement of Work" requiring the institution of a service charge system for the Center's publications and services.

The new "Statement of Work" offered two options for implementing the service charge system designed to achieve the Department of Defense objectives. The first option, a Net Billing Procedure would allow MDC to market, provide services and publications directly to industry and collect charges that would be used to increase the quality and quantity of services provided MDC users. The other option entailed negotiating a contract with The National Technical Information Service (NTIS) for dissemination of selected MDC publications and collection of service charges. Presently, MDC is planning to initiate the system of service charges under the Net Billing Procedure.

Machining Data Handbook

Preparation of the rough draft of the revised edition of the Machining Data Handbook was completed during this reporting period. Copies were reviewed and approved by Rock Island Arsenal and the Materials Support Division, Air Force Materials Laboratory, Wright-Patterson Air Force Base. The Second Edition was expanded to contain recommendations for 48 conventional machining and grinding operations, and five new sections of engineering information were added. It is estimated that final engineering review, composition and printing will be completed by early Spring of 1972.

Computerized User-Inquirer File

During this reporting period a major modification was completed to merge the Center's Inquiry, SIC (Standard Industrial Classification) and User File into one computerized system. The new system eliminated two separate card files and a metal plate Addressograph mailing system. Computer programs were written that will print mailing labels from the User-Inquiry File, maintain and print statistics on MDC's activities for reporting purposes and provide a more efficient and frequent method of updating the files.

MDC OPERATIONAL AREAS

At MDC, personnel work in ten functional areas of operation. These are indicated below along with the numbers used for time coding purposes:

1	Administration	Administration of technical and general activities of MDC
2	Engineering Supervision	Technical activities including all mechanized handling of data and processing of inquiries
3	Systems Analysis	Design of the machinability data system, particularly processing
4	Machining Data Analysis	Technical evaluation of machinability data and information including Preliminary Screening
5	Data Processing	Operation of a mechanized system including a computer
6	Data Control	Superimposition and use of controls to guarantee proper operation of data processing system
7	Document Acquisition and Document Storage	Acquisition of all types of data and information for processing. Storage of documents including those which have received Final Technical Evaluation and those in process
8	Data Dissemination	Dissemination including duplication and printing
9	Machining Data Verification - Experimental Machining	Laboratory and shop work necessary for resolving highly significant and controversial data situations
0	Secretarial and Clerical	Development and execution of all procedures relating to typing and filing

DISTRIBUTION OF MDC USER FILE

Names are added to the User File as a result of: 1) inquirers, 2) visitors, 3) additional names submitted by current Users, 4) requests resulting from dissemination of data publications, and 5) technical articles published in periodicals and announcements pertaining to the Center.

GENERAL CONCENTRATION OF USERS BY NUMBERS

STATES	ORGANIZATIONS	TOTAL NO. ORGANIZATIONS	STATES*	INDIVIDUAL	TOTAL INDIVIDUAL USERS
7	0	0	7	0	0
15	1-10	89	14	1-25	195
16	11-25	291	12	26-50	438
6	26-50	217	11	51-125	818
2	51-100	134	6	126-300	1,425
9	OVER-100	<u>1,810</u>	5	OVER-300	<u>3,246</u>
	TOTAL	2,541		TOTAL	6,122

AREA CONCENTRATION OF ORGANIZATIONS

West Coast (3 states)-	302 companies
Midwest (5 states) -	924 companies
North Central (3 states) -	518 companies
New England (6 states)-	272 companies

The total User File (6,122 individuals and 2,541 plants), can be broken down as follows:

Company Users (Individuals)	5,299
Companies	2,304
Educational Institutions (Individuals)	718
Colleges	206
Societies, Centers, etc. (Individuals)	105
Societies, Centers, etc.	31

* Includes Washington, D.C.

SUMMARY OF SPECIFIC INQUIRIES BY TYPE OF INQUIRY

October 1, 1970 - September 30, 1971

	NO. OF INQUIRIES	
	10/1/70-9/30/71	
1. RECOMMENDATIONS FOR A SPECIFIC MACHINING SITUATION. <i>Typical Example:</i> Requested recommendations for turning Waspaloy in the solution treated and aged condition.	128	
2. STARTING RECOMMENDATIONS FOR AN EXTENSIVE GROUP OF MACHINING SITUATIONS. <i>Typical Example:</i> Requested machinability data on AM-350, S-816, HS-25, Inconel X-750, Uniltemp M-252 and Hastelloy R-235.	268	
3. INFORMATION PERTAINING TO NEW MACHINING PROCESSES, EQUIPMENT AND TOOLS. <i>Typical Example:</i> Requested information on the manufacturer of equipment called "Liquid Lathe".	45	
4. COORDINATION AND POTENTIAL USE OF AFMDC. <i>Typical Example:</i> Requested detailed information on services available from AFMDC.	30	
5. REQUESTS FOR SPECIFIC DOCUMENTS, REPORTS, BOOKS, PAPERS, ETC. <i>Typical Example:</i> Requested a list of reports available for machining of titanium. Also wanted cost of each report.	54	
6. GENERAL INFORMATION SUCH AS SAFETY PRACTICES, NAMES OF FIRMS HAVING CERTAIN MACHINING CAPABILITIES, TOOL MATERIAL PROPERTIES, ETC. <i>Typical Example:</i> Requested the names of people to contact in the fields of metal removal such as EDM, ECM, ECO, EDG, USM, CHM, LBN, Abrasive Machining and Hot Machining.	25	
7. REQUESTS FOR BIBLIOGRAPHIES AND ABSTRACTS. <i>Typical Example:</i> Request for bibliographies with abstracts covering use of ceramic tools and abrasives in machining various materials.	4	
8. STATE-OF-THE-ART INFORMATION AND REPORTS <i>Typical Example:</i> Suggestions for important manufacturing programs for the next five years in the field of material removal. Supply problem, approach and approximate funds.	39	

SUMMARY OF SPECIFIC INQUIRIES BY TYPE OF INQUIRY (cont.)

October 1, 1970 - September 30, 1971

	NO. OF INQUIRIES	
	10/1/68-9/30/70	
9. SPECIAL INQUIRIES AND REPORTS FOR U.S. AIR FORCE, MANUFACTURING TECHNOLOGY DIVISION. <i>Typical Example:</i> Requested a report on the progress during the last five years in machining of titanium and hard to machine materials - state of the art.	2	
10. EVALUATION, TRANSLATION AND REVIEW OF REPORTS, BOOKS, PAPERS. <i>Typical Example:</i> Requested an evaluation of a report published in Electro-Technology, October 1964, concerning adaptive control possibilities.	1	
11. REQUESTS FOR INFORMATION ON METAL REMOVAL RATES. <i>Typical Example:</i> Requested information on maximum metal removal rates in turning and drilling of leaded steels.	4	
12. COMPARISON OF ONE PROCESS OR MATERIAL WITH ANOTHER. <i>Typical Example:</i> Requested a comparison of the machining of Inconel X with Inconel W in both solution treated and solution treated and aged conditions, primarily in turning out also drilling and milling if possible.	44	
13. INFORMATION PERTAINING TO CUTTING FLUIDS. <i>Typical Example:</i> Requested cutting fluid recommendations for titanium and a wide variety of high temperature alloys and stainless steels.	17	
14. INFORMATION ON MACHINABILITY RESEARCH. <i>Typical Example:</i> Requested machining information on the effect of work diameter on tool life, mathematical correlations of the various machining processes and the means of predicting the surface quality in milling.	114	
15. INFORMATION PERTAINING TO ESTIMATING COST, SETTING TIME STANDARDS, AND PRODUCTION RATES IN MACHINING. <i>Typical Example:</i> Requested information including formulas that could be used to predict production rates and costs.	34	
	TOTAL	807

*This total does not include requests for published data publications such as AFNDC reports.

ANALYSIS OF INQUIRIES BY STATE

October 1, 1970 - September 30, 1971

10 STATES LEADING INQUIRIES			
STATES	COMPANIES	INDIVIDUALS	NO. OF INQUIRIES
CALIFORNIA	28	38	56
CONNECTICUT	12	14	24
ILLINOIS	22	28	40
INDIANA	13	14	21
MASSACHUSETTS	16	17	25
MICHIGAN	27	36	58
MISSOURI	5	10	31
NEW YORK	20	24	31
OHIO	108	170	265
PENNSYLVANIA	39	46	63
TOTAL	290	397	514
OTHER STATES SUBMITTING INQUIRIES			
ALABAMA	2	3	5
ARIZONA	2	2	2
ARKANSAS	2	2	2
COLORADO	5	6	13
DISTRICT OF COLUMBIA	5	5	5
DELAWARE	4	4	7
FLORIDA	3	3	9
GEORGIA	2	2	3
IOWA	1	1	1
KANSAS	2	2	2
KENTUCKY	4	4	7
LOUISIANA	1	1	1
MAINE	1	1	1
MARYLAND	4	4	4
MINNESOTA	5	7	8
MISSISSIPPI	1	1	2
NEW JERSEY	10	10	12
NEW MEXICO	21	2	3
NORTH CAROLINA	3	3	10
OKLAHOMA	3	4	13
OREGON	1	1	4
RHODE ISLAND	5	6	7
SOUTH CAROLINA	1	1	1
TENNESSEE	5	6	14
TEXAS	11	14	18
VERMONT	5	5	15
VIRGINIA	5	6	6
WEST VIRGINIA	1	1	1
WASHINGTON	2	2	2
WISCONSIN	10	11	16
TOTAL	108	120	193
TOTAL FOR ALL STATES	398	517	807

ANALYSIS OF INQUIRIES BY MATERIAL GROUP

October 1, 1970 - September 30, 1971

MATERIAL GROUP	INQUIRIES
PLAIN CARBON & LOW ALLOY STEELS	99
ULTRA HIGH STRENGTH & TOOL STEELS	49
CARBIDES	5
CAST IRON	39
CAST STEELS	6
STAINLESS STEELS	40
NICKEL ALLOYS	4
MARAGING STEELS	19
HIGH TEMPERATURE ALLOYS	110
TITANIUM ALLOYS	50
REFRACTORY ALLOYS	21
BERYLLIUM ALLOYS	5
ZIRCONIUM ALLOYS	5
ALUMINIUM, MAGNESIUM, ZINC, LEAD, COPPER & TIN ALLOYS	57
PRECIOUS & RARE METALS	6
POWDER METALS	9
FOAMY METALS	0
NONMETALLICS INCLUDING CERAMICS, PLASTICS, GRAPHITE & COMPOSITES	48
MULTIPLE GROUP	91
UNITERM TYPE (NO GROUP)	247

ANALYSIS OF INQUIRIES BY TYPE OF MACHINING OPERATION

October 1, 1970 - September 30, 1971

OPERATION	INQUIRIES
<u>CONVENTIONAL CHIP REMOVAL</u>	
TURNING	19
BORING	19
MILLING (GENERAL)	4
FACE MILLING	18
END MILL SLOTTING	13
PERIPHERAL END MILLING	10
SLAB MILLING	2
ALL OTHER TYPES OF MILLING	11
DRILLING	14
GUN DRILLING	5
REAMING	9
TAPPING	79
GEAR CUTTING	4
BROACHING	9
ROUTING	0
BANDSAWING	4
TOTAL	340
<u>CONVENTIONAL GRINDING</u>	
GENERAL GRINDING	27
SURFACE GRINDING	12
CYLINDRICAL GRINDING	13
INTERNAL GRINDING	3
CENTERLESS GRINDING	2
ABRASIVE MACHINING	2
ABRASIVE BELT GRINDING	3
ABRASIVE CUTOFF	3
HONING	7
TOTAL	72
<u>ALTERNATE MACHINING METHODS</u>	
ELECTRICAL DISCHARGE MACHINING	26
ELECTROCHEMICAL MACHINING	11
ELECTROCHEMICAL GRINDING	6
CHEMICAL MACHINING	7
PHOTOCHEMICAL MACHINING	3
ULTRASONIC MACHINING	2
LASER MACHINING	6
ABRASIVE JET MACHINING	0
SUB-ZERO MACHINING	3
HOT MACHINING	1
THREAD ROLLING	2
TOTAL	70
<u>MISCELLANEOUS</u>	
BURNISHING	9
POLISHING	2
UNITERM DESCRIPTIVE OPERATIONS	328
MULTIPLE OPERATIONS	169
MISCELLANEOUS CONVENTIONAL OPERATIONS	40
TOTAL	548

SUMMARY OF INQUIRIES PROCESSED BY MDC FOR STSP* & SBA**

October 1, 1970 - September 30, 1971

NUMBER OF INQUIRIES FOR STSP*	
<u>STATE</u>	<u>NO. OF INQUIRIES</u>
MAINE	1
MICHIGAN	1
VERMONT	8
	TOTAL
	10

NUMBER OF INQUIRIES FOR SBA**	
<u>STATE</u>	<u>NO. OF INQUIRIES</u>
CALIFORNIA	1
COLORADO	3
MISSISSIPPI	2
MINNESOTA	2
OHIO	1
PENNSYLVANIA	4
TEXAS	2
	TOTAL
	15

STSP* - STATE TECHNICAL SERVICES PROGRAMS

SBA** - SMALL BUSINESS ADMINISTRATION TECHNOLOGY
UTILIZATION PROGRAMS

MACHINABILITY DATA CENTER

SUMMARY OF SPECIFIC INQUIRIES BY SIC* NUMBER

OCTOBER 1, 1970 - SEPTEMBER 30, 1971

SIC MAJOR GROUP NO.	SIC INDUSTRY NO.	<u>NUMBER OF INQUIRIES</u>		
		BY SIC INDUSTRY NO.	BY SIC MAJOR GROUP NO.	% OF TOTAL
91	FEDERAL GOVERNMENT		64	7.9
9100	DEFENSE SUPPLY AGENCY	2		
9100	U.S. DEPT. OF JUSTICE, WASHINGTON, D.C.	1		
9100	U.S. MARINE CORPS	1		
9100	U.S. DEPT. OF THE NAVY	3		
9100	U.S. DEPT. OF THE AIR FORCE	14		
9100	U.S. DEPT. OF THE ARMY	9		
9100	U.S. ATOMIC ENERGY COMMISSION	1		
9100	NATIONAL AERONAUTICS & SPACE ADMINISTRATION	8		
**9191	STATE TECHNICAL SERVICE PROGRAMS	10		
9192	SMALL BUSINESS ADMINISTRATION	15		
19	ORDNANCE AND ACCESSORIES		16	2.0
27	PRINTING, PUBLISHING, AND ALLIED INDUSTRIES		19	2.4
28	CHEMICALS AND ALLIED PRODUCTS		1	0.1
29	PETROLEUM REFINING AND RELATED INDUSTRIES		8	1.0
32	STONE, CLAY, GLASS, AND CONCRETE PRODUCTS		8	1.0
33	PRIMARY METAL INDUSTRIES		42	5.2
34	FABRICATED METAL PRODUCTS, EXCEPT ORDNANCE, MACHINERY, AND TRANSPORTATION EQUIPMENT		37	4.6
35	MACHINERY, EXCEPT ELECTRICAL		246	30.5
36	ELECTRICAL MACHINERY, EQUIPMENT AND SUPPLIES		74	9.2

* Standard Industrial Classification Manual (SIC). Executive Office of the President, Bureau of the Budget, 1967

** This SIC Number Was Assigned Because of the Special Significance of the State Technical Service Program

SUMMARY OF SPECIFIC INQUIRIES BY SIC* NUMBER (cont.)

		<u>NUMBER OF INQUIRIES</u>		
<u>SIC MAJOR GROUP NO.</u>	<u>SIC INDUSTRY NO.</u>	<u>BY SIC INDUSTRY NO.</u>	<u>BY SIC MAJOR GROUP NO.</u>	<u>% OF TOTAL</u>
37	TRANSPORTATION EQUIPMENT		160	19.8
3721	AIRCRAFT AND MISSILES	48		
3722	AIRCRAFT ENGINES & ENGINES PARTS -	73		
3729	MISSILE ENGINES			
	AIRCRAFT PARTS & AUXILIARY EQUIPMENT -			
	MISSILE PARTS	22		
	OTHERS	17		
38	PROFESSIONAL, SCIENTIFIC, AND CONTROLLING INSTRUMENTS: PHOTOGRAPHIC AND OPTICAL GOODS: WATCHES AND CLOCKS		6	0.7
39	JEWELRY, PRECIOUS METALS		2	0.2
40	RAILROADS, LINE-HAUL OPERATING		1	0.1
50	WHOLESALE TRADE		17	2.1
73	MISCELLANEOUS BUSINESS SERVICES		9	1.0
82	EDUCATIONAL SERVICES		63	7.8
86	NONPROFIT MEMBERSHIP ORGANIZATIONS		3	0.4
89	MISCELLANEOUS SERVICES		32	4.0
	TOTALS		807	100.0%

* Standard Industrial Classification Manual (SIC), Executive Office of the President,
Bureau of the Budget, 1967

COMPANIES AND AGENCIES SUBMITTING INQUIRIES TO MOC

OCTOBER 1, 1970 TO SEPTEMBER 30, 1971

* INDICATES NEW INQUIRIES

- A R INDUSTRIES CINCINNATI, OH
- ABBOTT LABORATORIES N CHICAGO, IL
- ABRASIVE ENGINEERING WHEATON, IL
- AERO RESEARCH APPLIC CTR BLOOMINGTON, IN
- AEROFET GENERAL CORP DOWNEY, CA
- DEPT OF THE AIR FORCE WRT-PTRSN AFB, OH
- DEPT OF THE AIR FORCE WRT-PTRSN AFB, OH
- AIR FORCE MATERIALS LAB WRT-PTRSN AFB, OH
- AIRFO ALLIED SCREW PRODUCT INC BERKLEY, CA
- ALL'S-CHALMERS MFG CO MISHAWAKA, IN
- ALLIS-CHALMERS MFG CO MATTESON, IL
- ALLOY STEELS, INC. MILWAUKEE, WI
- AMERICAN COMPUTER SERVICE CINCINNATI, OH
- AMERICAN HELLER CORP CINCINNATI, OH
- AMERICAN MICRO PRODUCTS CINCINNATI, OH
- AMERICA'S SOC ABRAS MTHD DETROIT, MI
- AMERICAN SOC FOR METALS METALS PARK, OH
- AMERICAN STANDARD INC CINCINNATI, OH
- AMERICAN TOOL WORKS CINCINNATI, OH
- AMMUNITION PROCS & SUPL JOLIET, IL
- AN CORN CINCINNATI, OH
- ANDERSON, INC CHICAGO, IL
- ANGLUS ENGINEERING CO SLY GROVE VLG, IL
- ARCO STEEL CORP MIDDLETON, OH
- DEPT OF THE ARMY CHARLOTTEVILLE, VA
- DEPT OF THE ARMY PHILADELPHIA, PA
- DEPT OF THE ARMY ROCK ISLAND, IL
- DEPT OF THE ARMY ROCK ISLAND, IL
- DEPT OF THE ARMY ST LOUIS, MO
- DEPT OF THE ARMY WARREN, MI
- ATAKA AMERICA INC NEW YORK, NY
- ATCO ENGRAVING CINCINNATI, OH
- U S ATOMIC ENERGY COMM WASHINGTON, DC
- AVCO CORPORATION EVERETT, WA
- AVCO CORPORATION LOWELL, MA
- AVCO CORPORATION RICHMOND, VA
- AVCO CORPORATION STRATFORD, CT
- BARCOCK & WILCOX CO ALLIANCE, OH
- BARCOCK & WILCOX CO BEAVER FALLS, PA
- BATTELLE DEVELOPMENT CORP COLUMBUS, OH
- BATTELLE MFG CO AL INST COLUMBUS, OH
- BECKER INST, INC FULLERTON, CA
- BEECH AIRCRAFT CORP BOULDER, CO
- BELL & HOWELL CO CHICAGO, IL
- BELL AEROSPACE CORP BUFFALO, NY
- BELL HELICOPTER CO FORT WORTH, TX
- BELL TELEPHONE LAB ALLENTOWN, PA
- THE BENDIX CORP GREENFIELD, MA
- THE BENDIX CORP KANSAS CITY, MO
- THE BENDIX CORP SOUTHFIELD, MI
- BERGMAN CONSULTANT CINCINNATI, OH
- BETHLEHEM STEEL CORP BALTIMORE, MD
- BINKS MACHINERY PROD CINCINNATI, OH
- BLUE ASM TOOL & DIE CO CINCINNATI, OH
- THE BOEING CO PHILADELPHIA, PA
- THE BOEING CO SEATTLE, WA
- BOSTON UNIVERSITY BOSTON, MA
- BRADEN INDUSTRIES INC BROKEN ARROW, OK
- BRANSON INSTRUMENTS INC COOKVILLE, TN
- BROWN & SHARP MFG CO ESMOND, RI
- BRUBAKER TOOL CORP MILLERSBURG, PA
- THE BUDD COMPANY FT WASHINGTON, PA
- THE BUDD COMPANY PHILADELPHIA, PA
- INDIANAPOLIS, IN
- BUSINESS WEEK MAGAZINE PITTSBURGH, PA
- C & C PRODUCTS INC CLEVELAND, OH
- C T L KOKOMO, IN
- CABOT CORPORATION CHULA VISTA, CA
- CALIFORNIA GENERAL INC HOUSTON, TX
- CAMERON IRON WORKS NIAGARA FALLS, NY
- CARBONURDUR CO MADISON HTS, MI
- CARNEGIE-MELLON UNIV PITTSBURGH, PA
- CASE WESTERN RES UNIV CLEVELAND, OH
- CATERPILLAR TRACTOR CO E PERRIA, IL
- CESSNA AIRCRAFT CO WICHITA, KS
- CHAMPION SPARK PLUG CO TOLEDO, OH
- CHANDLER EVANS INC WEST HARTFORD, CT
- CHRYSLER CORP NEW ORLEANS, LA
- UNIV OF CINCINNATI CINCINNATI, OH
- CINCINNATI INC CINCINNATI, OH
- CINCINNATI MILACRON CHEM CINCINNATI, OH
- CINCINNATI MILACRON INC BATAVIA, OH
- CINCINNATI MILACRON INC CINCINNATI, OH
- CINCINNATI MILACRON INC CINCINNATI, OH
- CLEVELAND AUTO MACH TOOL CINCINNATI, OH
- CLIMCO PRODUCTS INC CINCINNATI, OH
- U S DEPT OF COMMERCE WASHINGTON, DC
- CONTINENTAL AVIA & ENGRG TOLEDO, OH
- CONTINENTAL CAN CO CHICAGO, IL
- CONTINENTAL MACHINES SAVAGE, MN
- CONTINENTAL MOTORS CORP MUSKEGON, MI
- COPPERWELD STEEL COMPANY WARREN, OH
- CRAFTNEEDS INC CINCINNATI, OH
- CUMMINS ENGINE CO COLUMBUS, IN
- CURTISS SYSTEMS GRAND RAPIDS, MI
- CURTISS-WRIGHT CORP BUFFALO, NY
- DANIA CORP WOOD-RIDGE, NJ
- UNIVERSITY OF DAYTON IVORYTN, CT
- DAYTON MALLEABLE IRON CO DAYTON, OH
- DE HOFF CORP CRANSTON, RI
- DEFENSE METALS INFO CTR COLUMBUS, OH
- DEFENSE RESEARCH BOARD WASHINGTON, DC
- DEFENSE SUPPLY AGENCY DALLAS, TX
- DEFENSE SUPPLY AGENCY MEMPHIS, TN
- DEMPSEY-HALEY INDUSTRIES DAYTON, OH
- THE DENTISTS SUPPLY CO YORK, PA
- UNIVERSITY OF DENVER DENVER, CO
- UNIVERSITY OF DETROIT DETROIT, MI
- DEUTSCHE CO BANKING, CA
- COL J NICHOLAS DICK WASHINGTON, DC
- DOVER CORP S PLAINFIELD, NJ
- DOVER CORP CINCINNATI, OH
- THE DOW CHEM CO GOLDEN, CO
- DUNCAN MFG CO CINCINNATI, OH
- E I DUPONT DENEMOURS CO WILMINGTON, DE
- DYNAL QUIP INC COLUMBUS, OH
- ECIVRES INC NORWOOD, OH
- ELECTRON PROPERTY CTR CULVER CITY, CA
- ELLIOT CO JEANNETTE, PA
- EMERSON ELECTRIC CO MENA, AR
- EMERSON ELECTRIC CO MILFORD, CT
- EVEREDE TOOL CO CHICAGO, IL
- EX-CELL-O CORP OAK PARK, MI
- FISHER CONTROLS INC MARSHALLTOWN, IA
- UNIVERSITY OF FLORIDA GAINESVILLE, FL
- FORD MOTOR CO CINCINNATI, OH
- FORD MOTOR CO DEARBORN, MI
- FORD MOTOR COMPANY DETROIT, MI
- FRANKLIN INSTITUTE RES PHILADELPHIA, PA
- FRECON ENGINEERING CINCINNATI, OH
- KENNETH J GALT CO INDIANAPOLIS, IN
- GARDNER-DENVER CINCINNATI, OH
- THE GARRETT CORP PHOENIX, AZ
- GEBEL INDUSTRIES INC CINCINNATI, OH
- GENERAL DYNAMICS CORP CINCINNATI, OH
- GENERAL DYNAMICS CORP FORT WORTH, TX
- GENERAL ELECTRIC CO SAN DIEGO, CA
- GENERAL ELECTRIC CO BLOOMINGTON, IL
- GENERAL ELECTRIC CO BURLINGTON, VT
- GENERAL ELECTRIC CO CINCINNATI, OH
- GENERAL MOTORS CORP ANDERSON, IN
- GENERAL MOTORS CORP DAYTON, OH
- GENERAL MOTORS CORP FLINT, MI
- GENERAL MOTORS CORP INDIANAPOLIS, IN
- GENERAL MOTORS CORP SANDUSKY, OH
- GENERAL MOTORS CORP WARREN, MI
- GENERAL MOTORS CORP ST LOUIS, MO
- GENERAL STEEL IND CO FORD DU LAC, WI
- GIDDINGS & LEWIS MACH TL ROCHESTER, NY
- GOODYEAR AEROSPACE CORP AKRON, OH
- GOULD INC CLEVELAND, OH
- W R GRACE CO CLARKSVILLE, MD
- GRACO INC MINNEAPOLIS, MN
- GRAVELY CORP CLEMmons, NC
- GRAVELY CORP DUNBAR, NV
- GRAY & DUCTILE IRON SOC CLEVELAND, OH
- G A GRAY CO CINCINNATI, OH
- GREDE FOUNDRIES INC MILWAUKEE, WI
- GREEN ASSOC NEW RICHMOND, OH
- GRUMMAN AEROSPACE CORP BETHPAGE, NY
- M & M INDUSTRIES INC DAYTON, OH
- HAMILTON IND GRINDING HAMILTON, OH
- HAMMERLE INST & TOOL CO BROOKLYN, NY
- HEBERLEIN INC NEW YORK, NY
- HONEYWELL INC HOPKINS, MN
- HUGHES AIRCRAFT CO CULVER CITY, CA
- HUGHES AIRCRAFT CO TUCSON, AZ
- MT PRO TOOL CO NEW BEDFORD, MA
- INTERNATIONAL BUSNS MACH AUSTIN, TX
- INTERNATIONAL BUSNS MACH ONEGO, NY
- INTERNATIONAL BUSNS MACH ROCHESTER, MN
- INTERNATIONAL HARVESTER SAN DIEGO, CA
- INTERNATIONAL NICKEL CO NEW YORK, NY

- JAMITROL AERO COLUMBUS, OH
- JODEX CORP CINCINNATI, OH
- JONES & LAMSON SPRINGFIELD, VT
- U S DEPT OF JUSTICE WASHINGTON, DC
- KAISER AEROSPACE & ELEC GLENDALE, CA
- KAMAN CORP BLOOMFIELD, CT
- KAREL INDUSTRIES INC DELHAM FAYOR, NY
- KEARNEY & TRECKER CORP MILWAUKEE, WI
- KENNAN MANUFACTURING CO SEATTLE, WA
- KENNECOTT COPPER CORP LEXINGTON, MA
- EASTERN KENTUCKY UNIV RICHMOND, KY
- KERMER TOOL & DIE CO ERIE, PA
- KEYSTONE BOLT & NUT CORP CHALFONTE, PA
- JOE KIM CEDAR GROVE, NJ
- MAX KRONENBERG CINCINNATI, OH
- LADISH CO CUDAHY, WI
- LASERIMATION PHILADELPHIA, PA
- LATROBE STEEL CO LATROBE, PA
- LAWSON MANUFACTURING CO PEABODY, MA
- LE BLOND INC CINCINNATI, OH
- LEMIGH UNIVERSITY BETHLEHEM, PA
- LINCOLN ELECTRIC CO CLEVELAND, OH
- LING-TEMCO-VOUGHT INC DALLAS, TX
- LING-TEMCO-VOUGHT INC DALLAS, TX
- LING-TEMCO-VOUGHT INC WARREN, MI
- LING-TEMCO-VOUGHT INC WARREN, MI
- ARTHUR D LITTLE CO INC CAMBRIDGE, MA
- LOCKHEED AIRCRAFT CORP BURBANK, CA
- LOCKHEED AIRCRAFT CORP MARIETTA, GA
- LOCKHEED AIRCRAFT CORP PALO ALTO, CA
- LOCKHEED AIRCRAFT CORP REDLANDS, CA
- LODGE & SHIPLEY CO CINCINNATI, OH
- MUDSON, OH
- A M LORD CO CINCINNATI, OH
- W A MADDOX BANGOR, ME
- UNIVERSITY OF MAINE HOUSTON, TX
- MALLAY TOOL SERVICE INDIANAPOLIS, IN
- P R MALLORY MANKATO, MN
- MANKATO STATE COLLEGE QUANTICO, VA
- U S MARINE CORPS E PROVIDENCE, RI
- MARK III INC BALTIMORE, MD
- MARTIN MARIETTA CORP DENVER, CO
- MARTIN MARIETTA CORP ORLANDO, FL
- MASTER CHEMICAL CORP PERRYSBURGH, OH
- MC DONNELL DOUGLAS CORP LONG BEACH, CA
- MC DONNELL DOUGLAS CORP SANTA MONICA, CA
- MC DONNELL DOUGLAS CORP ST LOUIS, MO
- MECHANICAL PROD DATA CTR TRAVERSE CITY, MI
- METAL IMPROVEMENT INC CINCINNATI, OH
- UNIVERSITY OF MICHIGAN ANN ARBOR, MI
- EASTERN MICHIGAN UNIV YPSILANTI, MI
- MIDWEST CENTRALS GRNDG CINCINNATI, OH
- MINE SAFETY APPLIANCES EVANS CITY, PA
- UNIVERSITY OF MISSOURI COLUMBIA, MO
- MODERN MACHINE SHOP CINCINNATI, OH
- MODERN PATTERNS&PLASTICS TOLEDO, OH
- MONARCH MACHINE TOOL CO SIDNEY, OH
- MOOG INC BUFFALO, NY
- MUELLER BRASS CO PORT HUROK, MI
- MUSKEGO TOOL IND, INC MUSKEGO, WI
- NATIONAL AEROSPACE ADM CLEVELAND, OH
- NATIONAL AEROSPACE ADM HAMPTON, VA
- NATIONAL AEROSPACE ADM HUNTSVILLE, AL
- NATIONAL AUTOMATIC TL CO RICHMOND, IN
- NATIONAL ELECTROSTATICS MIDDLETON, WI
- NATIONAL JET SALES CORP LA VALE, MD
- NATIONAL LEAD CO OF OHIO CINCINNATI, OH
- DEPT OF THE NAVY NEWPORT, RI
- DEPT OF THE NAVY SAN DIEGO, CA
- DEPT OF THE NAVY WARMINTON, PA
- NEW YORK STATE DEPT ALBANY, NY
- MILES PRECISION CO NILES, MI
- NORRIS INDUSTRIES NEWARK, NJ
- NORTH AMERICAN ROCKWELL CANOGA PARK, CA
- NORTH AMERICAN ROCKWELL EL SEGUNDO, CA
- NORTH AMERICAN ROCKWELL LOS ANGELES, CA
- NORTH AMERICAN ROCKWELL MCGREGOR, TX
- NORTH AMERICAN ROCKWELL TULSA, OK
- NORTH CAROLINA ST UNIV RALEIGH, NC
- NORTON COMPANY WORCHESTER, MA
- NORWICH UNIVERSITY NORTHFIELD, VT
- OAK ELECTRONICS CORP CRYSTAL LAKE, IL
- OLIVETTI NUMERICAL CO ELMHAURST, NY
- OWNERS-ILLINOIS INC TOLEDO, OH
- PEARL EQUIPMENT CO NASHVILLE, TN
- PENN CENTRAL TRANS CO ALTOONA, PA
- PENNSYLVANIA STATE UNIV UNIVERSITY PK, PA
- PERKINS MACHINE CO WARREN, MA
- PETERSON BUILDERS INC STURGEON BAY, WI
- PFAUDLER COMPANY ELYRIA, OH
- PHILCO-FORD CORP NEWPORT BEACH, CA
- PHOTOLASTIC INC MALVERN, PA
- PHYSICAL SCIENCE INC MACON, GA
- PIONEER ASTRO INDUST INC CHICAGO, IL
- UNIV OF PITTSBURGH PITTSBURGH, PA
- PLANET PRODUCTS CORP CINCINNATI, OH
- PLASTILINE INC POPPANO BEACH, FL
- POLAROID CORPORATION CAMBRIDGE, MA
- POLYMET CORPORATION CINCINNATI, OH
- PORTER PRECISION PRODS EAST HARTFORD, CT
- PRODUCTO MACHINE CO BRIDGEPORT, CT
- PROMEX COMPANY INC CHERRY HILL, NJ
- PURDUE UNIVERSITY W LAFAYETTE, IN
- R S C ASSOCIATES CLINTON, NY
- RADIATION INTERNATIONAL PORTLAND, OR
- RADIO CORPORATION OF AM LANCASTER, PA
- RAYCON CORP ANN ARBOR, MI
- GILBERT REITER STRATFORD, CT
- REMINGTON ARMS CO INC BRIDGEPORT, CT
- RESEARCH COTRELL INC BOUND BROOK, NJ
- RESTROID ENGRG CORP SKOKIE, IL
- REX CHAINBELT INC DOWNERS GROVE, IL
- REYNOLDS METALS CO RICHMOND, VA
- REYNOLDS METALS CO WINSTON SALEM, NC
- R J PEYNOLDS TOBACCO CO KINGSTON, RI
- RHODE ISLAND UNIVERSITY CHULA VISTA, CA
- ROHR CORPORATION CONVERSVILLE, IN
- ROOTS-CONNERSVILLE BAY SHORE, NY
- C RUSSELL CO KING OF PRUSS, PA
- S F INDUSTRIES ROCHESTER, NY
- S P C MACHINERY INC SAGINAW, MI
- SAM JOSE CITY COLLEGE SAN JOSE, CA
- SANDIA CORPORATION ALBUQUERQUE, NM
- SCHNEIDER INSTRUMENT CO CINCINNATI, OH
- SEIFREAT-ELSTAD MACH CO DAYTON, OH
- SERVICEMASTER IND SVS CO ROCKFORD, IL
- SIGNODE CORP FLORENCE, KY
- THE SINGER COMPANY SOMERVILLE, NJ
- SINGERS GENERAL PRECISN LITTLE FALLS, NJ
- SMALL BUSINESS ADMIN BALA CYWYD, PA
- SMALL BUSINESS ADMIN CLEVELAND, OH
- SMALL BUSINESS ADMIN DALLAS, TX
- SMALL BUSINESS ADMIN DENVER, CO
- SMALL BUSINESS ADMIN JACKSON, MS
- SMALL BUSINESS ADMIN LOS ANGELES, CA
- SMALL BUSINESS ADMIN MINNEAPOLIS, MN
- A O SMITH CORP MT STERLING, KY
- SOUTHERN AUTOMATICS INC CINCINNATI, OH
- SOUTHERN RESEARCH INST BIRMINGHAM, AL
- SPECTRA-MAT INC WATSONVILLE, CA
- SQUARE D CO CLEVELAND, OH
- THE STANDARD OIL CO CLEVELAND, OH
- STANDARD PRESSED STEEL SANTA ANA, CA
- STANFORD RESEARCH INST MENLO PARK, CA
- STRUCTURAL DYNAMICS RES CINCINNATI, OH
- SUNOSTRAND CORP ROCKFORD, IL
- SUPERMETAL COMPANY TROTWOOD, OH
- SYLVANIA ELEC PROD INC TOWANDA, PA
- TECH ETC INC MINGHAM, MA
- TELEDYNE INDUSTRIES INC MILWAUKEE, WI
- TELEX COMPUTER PRODUCTS TULSA, OK
- UNIVERSITY OF TENNESSEE KNOXVILLE, TN
- TIMKEN COMPANY CINCINNATI, OH
- TIPP MACHINE & TOOL CO TIPP CITY, OH
- TOOL STEEL GEAR & PIXON TORIN CORP
- TORIN CORP TORRINGTON CORP
- TRW INC CLEVELAND, OH
- TRW INC DANVILLE, PA
- TRW INC HARRISBURG, PA
- CHARLES TURPIN & CO MAYLAND, MA
- TWIN CITY TOOL COMPANY OLATHE, KS
- THE U S BAIRD CORP STRATFORD, CT
- U S STEEL CORPORATION GARLAND, TX
- U S STEEL CORPORATION PITTSBURGH, PA
- UNION CARBIDE CORP OAK RIDGE, TN
- UNITED AIRCRAFT PRODUCTS DAYTON, OH
- UNIVERSAL PRECISION LAKE FOREST, IL
- VALERON CORP ALLISON PARK, PA
- VALLEY ENGRG & MFG CORP WILKES BARRE, PA
- VALLEY TODECO INC SYLMAR, CA
- VASCO LATROBE, PA
- UNIVERSITY OF VERMONT BURLINGTON, VT
- UNIVERSITY OF VERMONT BURLINGTON, VT
- VERMONT AMERICAN CORP LOUISVILLE, KY
- VR WESSON CO WAUKESHA, IL
- WALKER MACHINERY CO CINCINNATI, OH
- WALLACE-MURRAY CORP LOCKPORT, NY
- WALLOU TOOL & DIE CO CINCINNATI, OH
- THE WALMET CORP PLEASANT RIDG, MI
- CLAIRE WALSH CINCINNATI, OH
- WAUREKA CUTTING TOOLS WAUKESHA, WI
- WENDT-SOMIS CO ROGERS, AR
- WEST MILTON PREC TOOL CO VANDALIA, OH
- WESTERN ELECTRIC CO INC ALLEGTON, PA
- KEARNY, NJ
- WESTERN ELECTRIC CO INC PHILADELPHIA, PA
- WESTINGHOUSE ELECTRIC PITTSBURGH, PA
- WESTINGHOUSE ELECTRIC SUMMERTIME, CA
- WESTINGHOUSE ELECTRIC WEST MIFFLIN, PA
- WESTINGHOUSE ELECTRIC CINCINNATI, OH
- WHEELOCK LOVEJOY & CO BENTON HARBOR, MI
- WIRLPOOL CORP DEARBORN, MI
- WILLEYS CARBIDE TOOL CO LINDEN, NJ
- THE WING CO CENTERVILLE, OH
- W C WINSTANLEY & ASSOC MADISON, WI
- UNIVERSITY OF WISCONSIN ROCKFORD, IL
- WOODWARD GOVERNOR CO CINCINNATI, OH
- WORD INC BLUE BELL, PA
- TARWAY CORP

POTENTIAL FOR MDC SERVICES TO INDUSTRY

STATISTICAL SUMMARY OF METALWORKING PLANTS PARTIAL LIST FROM DUN & BRADSTREET METALWORKING, DIRECTORY 1971			MDC SUMMARY OF INQUIRIES FOR 7 SIC GROUPS OCTOBER 1, 1970 - SEPTEMBER 30, 1971		
STANDARD INDUSTRIAL CLASSIFICATION (SIC) NUMBER & INDUSTRY CLASSIFICATION	NO. OF COMPANIES*	MAJOR PRODUCT MANUFACTURED NO. OF INDIVIDUALS	NUMBER OF MDC COMPANIES	NUMBER OF MDC INQUIRIES	TOTAL INQUIRIES
MAJOR GROUP 37 - TRANSPORTATION EQUIPMENT SIC INDUSTRY NO.	"	"	"	"	"
3721 - AIRCRAFT & MISSILES	82	268,947	21	33	48
3722 - AIRCRAFT EQUIPMENT & PARTS	142	164,372	17	44	73
3729 - AIRCRAFT PARTS & ACCESSORY EQUIPMENT	542	139,838	11	15	22
MAJOR GROUP 33 - PRIMARY METAL INDUSTRIES	4,223	1,310,993	22	28	42
MAJOR GROUP 34 - FABRICATED METAL PRODUCTS, EXCEPT ONEWAY, MANUFACTORY & TRUCK & PORTATION EQUIPMENT	11,818	1,359,472	21	24	37
MAJOR GROUP 35 - MACHINERY, EXCEPT ELECTRICAL	17,419	1,993,477	116	150	246
MAJOR GROUP 36 - ELECTRICAL MACHINERY, EQUIPMENT & SUPPLIES	1,267	1,914,476	34	45	74
	35,493	1,151,475	242	339	542

* 10 or more employees

DESCRIPTION OF MDC DATA PUBLICATIONS

October 1, 1970 - September 30, 1971

<u>DESCRIPTION & CONTENT</u>	<u>NO. OF COPIES DISSEMINATED</u>	<u>SALES INCOME</u>
AFMDC 65-1, MACHINING DATA FOR TITANIUM ALLOYS, AUGUST 1965 Turning, Face Milling, End Mill Slotting, Peripheral End Milling, Drilling, Reaming, Tapping, Broaching, and Surface Grinding for Commercially Pure Titanium, Alpha & Alpha-Beta, and Beta Alloys.	75	\$ 112.50
AFMDC 66-1, MACHINING DATA FOR NUMERICAL CONTROL, DECEMBER 1966 Contains all the data originally printed in the 7 individual reports, AFMDC 66-1.1 through 66-1.7	82	410.00
AFMDC 66-2, GRINDING RATIOS FOR AEROSPACE ALLOYS, JUNE 1966 Surface Grinding of Alloy Steels, Ultra-High Strength Steels, Tool Steels, Stainless Steels, Titanium Alloys, High Temperature Alloys, Refractory Alloys, and Nonmetallics.	37	37.00
AFMDC 66-3, MACHINING DATA FOR BERYLLIUM METAL, JUNE 1966 This booklet covers problems involved in machining beryllium, in addition to specific data for 10 conventional operations and 4 alternate machining methods.	98	98.00
AFMDC 68-1, DETERMINATION AND ANALYSIS OF MACHINING COSTS AND PRODUCTION RATES USING COMPUTER TECHNIQUES, AUGUST 1968 This data publication describes a practical approach to the problem of obtaining machining costs and production rates. It includes equations, numerous computer calculations, and computer source program listings.	77	269.50
AFMDC 68-2, 1960 SUPPLEMENT TO MACHINING DATA FOR NUMERICAL CONTROL, AUGUST 1968 This supplement is a companion volume to Machining Data for Numerical Control (AFMDC 66-1). Machining data are presented for the newer aerospace materials.	58	174.00
AFMDC 70-1, MACHINING OF HIGH STRENGTH STEELS WITH EMPHASIS ON SURFACE INTEGRITY, JUNE 1970 This book was prepared from data collected on various high temperature alloys and both conventional and nonconventional machining operations. The emphasis is in the presentation of machining data and information is on providing guidelines for maintenance of high surface quality and in particular high surface integrity.	129	1,935.00
USAF MACHINABILITY REPORTS, VOL. 1 thru 4	69	919.00
TOTAL	625	\$3,955.00

MDC OPERATING COSTS

OCTOBER 1, 1970 - SEPTEMBER 30, 1971

<u>INPUT COSTS</u>		
TECHNICAL EVALUATION		\$ 26,056.49
DATA PROCESSING		23,144.30
DOCUMENT ACQUISITION & REPRODUCTION		<u>4,702.60</u>
EQUIPMENT, SUPPLIES & SERVICES		53,903.09
		<u>11,049.56</u>
	TOTAL	64,943.65
<u>OUTPUT COSTS</u>		
<u>INQUIRIES</u>		
TECHNICAL EVALUATION		32,974.21
DATA PROCESSING & RETRIEVAL		2,842.40
DATA ACQUISITION & REPRODUCTION		<u>3,102.00</u>
GOVERNMENT AGENCIES	1,933.00	38,918.61
(NOT INCLUDING SBA & STSP)		
ALL OTHER ORGANIZATIONS	<u>-26,985.61</u>	
	SUBTOTAL	38,918.61
<u>DATA PUBLICATIONS</u>		
DATA PUBLICATIONS COMPLETED & IN PROCESS*		35,100.93
EQUIPMENT, SUPPLIES & SERVICES		<u>6,675.69</u>
		<u>41,776.62</u>
	TOTAL	80,595.23
<u>GENERAL DISSEMINATION -</u>		
GENERAL DISSEMINATION OF MACHINABILITY DATA & CENTER INFORMATION		14,087.13
EQUIPMENT, SUPPLIES & SERVICES		<u>1,540.54</u>
	TOTAL	15,627.67
<u>REPORTS</u>		
<u>MDC SYSTEMS REPORTS</u>		
MDC, MSD AND INFORMATION BRANCH MEETINGS AND SPECIAL MSD REPORTS		9,623.56
EQUIPMENT, SUPPLIES & SERVICES		<u>4,621.63</u>
	TOTAL	14,245.19
<u>SYSTEMS ANALYSIS, MODIFICATION & CONTROL</u>		
TECHNICAL EVALUATION		1,701.74
DATA PROCESSING - IBM 1130		
TECHNICAL & SYSTEMS ASPECTS		22,382.72
OPERATIONS MANUAL & CODE BOOK REVISIONS & ADDITIONS		<u>86.40</u>
EQUIPMENT, SUPPLIES & SERVICES		24,170.86
		<u>1,797.30</u>
	TOTAL	25,968.16
TOTAL ACTUAL COSTS NOT INCLUDING FIXED FEE		\$ 201,479.90

* INCLUDES FINAL PREPARATION OF MACHINING DATA HANDBOOK

ESTIMATED COST SAVINGS RESULTING FROM MDC'S OPERATION

OCTOBER 1, 1964 - SEPTEMBER 30, 1971

COST SAVINGS RESULTING FROM MDC'S

RESPONSE TO SPECIFIC INQUIRIES

Total Number of Specific Inquiries 6,546

Estimated Total Number of Machining Situations Included in the 6,546
Inquiries - 32,730

Estimated Savings per Machining Situation Response - \$800.00

Estimated Total Savings Resulting from Specific Inquiries - 32,730
Machining Situations x \$800.00 = \$26,184,000.00

COST SAVINGS RESULTING FROM MDC'S 14 DATA PUBLICATIONS

Total Number of Data Publications Copies Distributed - 19,294

Estimated Number of Machining Situations Utilized per Data Publications
Copy - 5

Estimated Total Number of Machining Situations - 19,294 Data Publication
Copies x 5 - 96,470

Estimated Savings per Machining Situation - \$300.00

Estimated Total Savings Resulting from Data Publications - 96,470 Machining
Situations x \$300.00 = \$28,941,000.00

TOTAL ESTIMATED COST SAVINGS RESULTING FROM MDC'S OPERATION

\$55,125,000.00

ECONOMIC ENVIRONMENT FOR MDC OPERATIONS

(ANNUAL COSTS)

Labor and Overhead Costs for Operating Metal Cutting Machine Tools in the United States

Total number of metal cutting machine tools in the metalworking industries	=	2,500,000*
Average labor cost + overhead	=	\$8.00 per hour
Average working day	=	8 hours
Number of working days per year	=	250
Average number of direct labor personnel per machine	=	1
Total cost of labor + Overhead: $2,500,000 \times \$8.00 \times 8 \times 250 \times 1$	=	\$40,000,000,000
<u>\$40,000,000,000</u>		

*Based on American Machinist Tenth Inventory (1968)

Total Shipments Including Exports of Metal Cutting Type Metalworking Machinery

\$1,097,718,000

Source: U.S. Department of Commerce (1970)

Machine Tool Accessories Industry

Small cutting tools for machine tools and metalworking machinery in the amount of \$670,000,000, includes \$45,500,000 for tool holders.

Source: U.S. Department of Commerce (1970)

MDC INPUT & OUTPUT SUMMARY

SYSTEM INPUT

October 1, 1964 - September 30, 1971

Document and Card Totals

Documents Entered into the System (including Specific Inquiries)

Oct. 1, 1964 - Jan. 31, 1967	17,576
Feb. 1, 1967 - Jan. 31, 1968	3,695
Feb. 1, 1968 - Sept. 30, 1968	2,341
Oct. 1, 1968 - July 31, 1969	3,316
Aug. 1, 1969 - Sept. 30, 1970	5,638
Oct. 1, 1970 - Sept. 30, 1971	<u>3,408</u>
	Total 35,974

Evaluated Documents (including Specific Inquiries)

Oct. 1, 1964 - Jan. 31, 1967	9,367
Feb. 1, 1967 - Jan. 31, 1968	3,734
Feb. 1, 1968 - Sept. 30, 1968	2,840
Oct. 1, 1968 - July 31, 1969	3,780
Aug. 1, 1969 - Sept. 30, 1970	7,522
Oct. 1, 1970 - Sept. 30, 1971	<u>2,649</u>
	Total 29,892

Total Cards Punched

Oct. 1, 1964 - Jan. 31, 1967	75,173
Feb. 1, 1967 - Jan. 31, 1968	27,077
Feb. 1, 1968 - Sept. 30, 1968	13,833
Oct. 1, 1968 - July 31, 1969	33,868
Aug. 1, 1969 - Sept. 30, 1970	27,054
Oct. 1, 1970 - Sept. 30, 1971	<u>11,316</u>
	Total 188,321

SYSTEM OUTPUT

Data Publications

	Copies Distributed
AFMDC 65-1, Machining Data for Titanium Alloys	6,276
AFMDC 66-1, Machining Data for Numerical Control	1,327
AFMDC 66-2, Grinding Ratios for Aerospace Alloys	1,121
AFMDC 66-3, Machining Data for Beryllium Metal	1,476
AFMDC 68-1, Determination & Analysis of Machining Cost & Production Rates Using Computer Techniques	1,086
AFMDC 68-2, 1968 Supplement to Machining Data for Numerical Control	847
AFMDC 70-1, Machining of High Strength Steels with Emphasis on Surface Integrity	514
USAF Machinability Reports, Vol. 1 thru 4	69

Unit Costs

Average Cost Per Inquiry (807) - Oct. 1, 1970 - Sept. 30, 1971 \$ 48.23

MDC VISITS FOR ACQUISITION AND
DISSEMINATION OF MACHINABILITY INFORMATION

October 1, 1970 - September 30, 1971

AMERICAN SOCIETY FOR INFORMATION SCIENCE 33RD ANNUAL MEETING (Attended)
Philadelphia, Pennsylvania
October 11-15, 1970

VISITED TO SOLVE PROBLEM OF BROACHING STACKED SILICON STEEL LAMINATIONS
Mt. Sterling, Kentucky
November 16, 1970

CONFERENCE ON MACHINING COSTS AND PRODUCTION RATES (Participated)
Delta College, Bay City, Michigan
December 9, 1970

PROGRAM FOR THE EAST/CENTRAL ENGINEERING CONFERENCE AND TOOL EXPOSITION (Participated)
Sponsored by the Society of Manufacturing Engineers
Cincinnati Convention Center, Cincinnati, Ohio
January 19, 20 & 21, 1971

1971 INTERNATIONAL TOOL EXPOSITION AND ENGINEERING CONFERENCE (Attended)
Sponsored by the Society of Manufacturing Engineers
Dearborn, Michigan
April 28 & 29, 1971

4TH ANNUAL INDUSTRIAL SEMINAR (Participated)
Sponsored by the Society of Manufacturing Engineers and Purdue University
Indiana University-Purdue University at Indianapolis
May 8, 1971

FORUM ON THE MANAGEMENT OF INFORMATION ANALYSIS CENTERS (Participated)
Sponsored by the COSATI Panel on Information Analysis Centers
National Bureau of Standards, Gaithersburg, Maryland
May 17, 18 & 19, 1971

SOCIETY OF MANUFACTURING ENGINEERS (Presentation on MDC)
Knoxville-Oak Ridge, Tennessee
June 3, 1971

ATTENDED INTERNATIONAL MACHINABILITY DATA CONFERENCE IN EUROPE (AACHEN, FRANKFURT) TO OBTAIN
INFORMATION ON EUROPEAN AND JAPANESE STATUS OF MACHINABILITY DATA BANKS
Dr. Max Kronenberg
June 1971

OHIO VALLEY CHAPTER - NUMERICAL CONTROL SOCIETY MEETING (Participated)
Cincinnati, Ohio
September 28, 1971

THE MACHINING CONFERENCE (Participated)
The Cleveland State University - Division of Continuing Education
Cleveland, Ohio
November 2, 1971